Which factors are associated with hospitalisation in people presenting with convulsions to ambulance services? Cross sectional study using ambulance and hospital linked data

Dr Zahid Asghar[1], Dr Murray D. Smith[1], Anne Spaight[2], Dr Jon Dickson[3], Dr Philip Miller[4], Dr Frank Coffey[4], Prof A. Niroshan Siriwardena[1,2]

[1]Community and Health Research Unit, University of Lincoln, [2]East Midlands Ambulance Service NHS Trust, [3]School of Medicine, University of Sheffield, [4]Nottingham University Hospital.

Introduction

Patients with suspected seizure result in a large number of emergency calls to ambulance services: around 3% of all calls to EMAS are due to patients with seizure which makes this the sixth highest volume single issue call to the service. Some of these patients are conveyed to the emergency department (ED) which accounts for most of the health costs.

Aims

We aimed to investigate which factors are associated with hospitalisation in this patient group.

Results: *Patient characteristics*

Age (years)	N=696	Percentage
0-15	179	25.7
16-25	117	16.8
26-35	84	12.1
36-45	89	12.8
46-55	84	12.1
56-65	62	8.9
>65	81	11.6

Sex	N=517 (age≥16)	%
F	246	47.6
M	271	52.4

NEWS2	N=517 (age≥16)	%
0	171	33.1
1	127	24.6
2	70	13.5
3	149	28.8

Time on scene	N=517 (age≥16)	%
<10min	4	0.8
10min-<20min	91	17.6
20min-<30min	169	32.7
30min-<40min	117	22.6
40min-<50min	54	10.4
≥50min	58	11.2
missing	24	4.6

Age group (years)	ICU admission	%	Hospital admission	%
16-25	3	12.5	17	8.6
26-35	3	12.5	25	12.7
36-45	7	29.2	34	17.3
46-55	1	4.2	39	19.8
56-65	3	12.5	30	15.2
>65	7	29.2	52	26.4
Total	24		197	

Method

We used a cross sectional design linking ambulance dispatch and clinical data with hospital Emergency Department and inpatient data from July 2016 to June 2017.

Inclusion criterion: Adults aged 16 years or over with ambulance records including the terms ‘convulsion’ or ’fitting and hospital records confirming the diagnosis of convulsion.

Descriptive statistics: Ambulance service process data, ambulance response times, demographic data and clinical (physiological) findings summarised as NEWS2 (incorporating respiratory rate, oxygen saturation, systolic blood pressure, pulse rate, conscious level and temperature) and treatments.

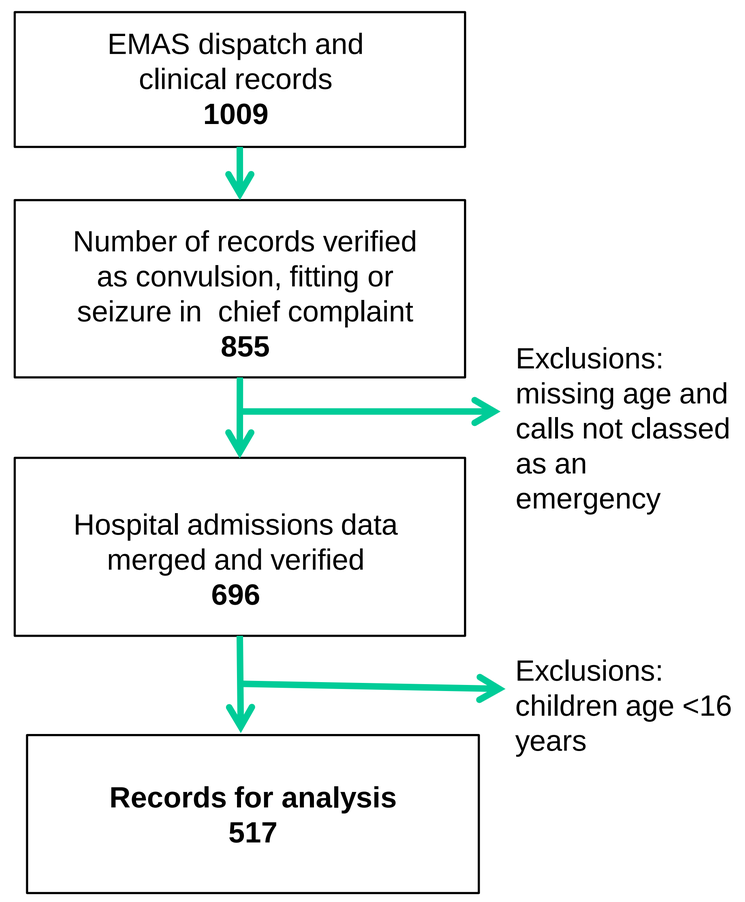
Statistical Models: We used logistic regression to construct models showing predictors of admission to hospital or intensive care unit (ICU).

Results: *Regression models*

Hospital admission	Odds ratio	P-value	[95% Conf. Interval]
Age group (years): 16-25	reference		
26-35	2.6	0.013	(1.2 - 5.4)
36-45	4.0	<0.01	(2.0 - 8.3)
46-55	4.9	<0.01	(2.4 - 10.1)
56-65	5.1	<0.01	(2.3 – 11.0)
>65	**12.4**	**<0.01**	**(5.7 - 26.6)**
Sex: female	reference		
male	1.9	<0.01	(1.3 - 2.9)
NEWS2: 0	reference		
1	1.0	0.9	(0.6 - 1.7)
2	1.4	0.3	(0.7 - 2.8)
3	**2.1**	**<0.01**	**(1.2 - 3.5)**
Time on scene:<20min	reference		
<10min	8.1	0.2	(0.4 - 153.9)
<30min	1.6	0.1	(0.9 – 3.0)
<40min	**2.1**	**<0.01**	**(1.1 - 4.1)**
<50min	2.0	0.1	(0.9 - 4.5)
≥50min	2.7	0.011	(1.3 - 6)

ICU admission	Odds ratio	P-value	[95% Conf. Interval]
Age group (years): 16-25	reference		
26-35	3.0	0.3	(0.4 - 20.4)
36-45	7.6	0.025	(1.3 – 45.0)
46-55	1.7	0.7	(0.1 - 21.2)
56-65	3.9	0.2	(0.5 - 27.1)
>65	**10.4**	**<0.01**	**(1.8 - 60.7)**
Sex: female	reference		
male	1.6	0.4	(0.6 - 4.7)
NEWS2: 0	reference		
1	0.4	0.4	(0.0 - 3.5)
2	1(omitted)		only 1 person
3	**8.2**	**<0.01**	**(2.5 - 27.4)**
Time on scene : <20min	reference		
<10min	**50.9**	**0.037**	**(1.3 - 2041.8)**
<30min	1.2	0.8	(0.3 - 4.6)
<40min	0.4	0.4	(0.1 - 2.9)
<50min	1.7	0.5	(0.3 - 10)
≥50min	1.4	0.7	(0.3 - 7.1)

Data extraction process



Findings

517 adult patients aged 16+ years had a hospital diagnosis of seizure, with 42.8% (221/517) admitted, 24 of which were to the ICU. Most patients with convulsions were therefore not hospitalised. Male patients were more likely to be admitted and older patients with greater physiological disturbance were more likely to receive intensive care.

Regression model results

The regression model suggests, older patients aged 65+ years were more likely to be admitted (OR 12.4, 95% CI 5.7 - 26.6, p<0.01) compared with younger patients aged 16-25 years male patients (OR 1.9, 95%CI 1.3 - 2.9, p<0.01) compared with females and those with NEWS2 of 3 vs zero (OR 2.1, 95%CI 1.2 - 3.5, p<0.01) were more likely to be admitted. Older patients aged 65 years+ (OR 10.4, 95% CI 1.8 - 60.7, P<0.01) compared with those aged 16-25 years and those with NEWS2 score 3 vs zero (OR 8.2, 95%CI 2.5 - 27.4, P<0.01) were more likely to be admitted to intensive care.

Limitations

Use of electronic clinical records varied at EMAS and this was a potential source of bias in the data. Prehospital datasets linked with Hospital Episode Statistics may not capture all the patients due to matching errors or duplicates, requiring visual inspection of the data.

Acknowledgements

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